Schruhl, Derek

From: Rau, Rob
Sent: Friday, February 19, 2016 12:16 PM
To: pony@pgwg.com
Cc: wiyall@cowlitz.org; MOllivant@parametrix.com; steven.anderson@ihs.gov; Contreras, Peter; Schruhl, Derek
Subject: Hydrogeology at proposed Cowlitz Casino/Hotel

Hi Pony.

As we discussed during Wednesday's meeting, I'm sending this email to restate some questions we had regarding the hydrogeology at the proposed Cowlitz casino/hotel as described in the Final Feasibility Study Report. In addition to documenting your responses, this will provide EPA with additional information and clarification on the groundwater flow model and the proposed monitoring network. Please let me know if you have any questions. Thank you, Rob.

1) There was concern that the model did not adequately account for the heterogeneity and anisotropy of both the aquifer and the vadose, including possible perched zones that have been reported in the project area. It was also suggested that the FS could have provided more discussion of the model uncertainty.

2) Figure 6 in Appendix B of the FS shows the results of particle tracking simulations in both plan view and cross section. EPA suggested that these figures be presented in greater detail to better demonstrate how the injected plume could affect downgradient wells beyond the property boundary. For example, these figures could be presented in three dimensions and displayed at a larger scale with surface features shown on the cross section or block diagram. Particle tracking simulations showing flow paths could also be run with varying model input parameters to visually show how model sensitivity could affect off-site residents. Travel time markers were shown for one year and five years on the flow path diagrams in Figure 6. You had mentioned about looking into the significance of a one year residence or travel time. You discussed the existing information you believe addresses groundwater flow without the need for additional model simulations. Please summarize the aspects of the model inputs and hydrogeologic characterization that you reviewed with us during the meeting.

3) Table 5 identifies a mound height of 0.5 feet beneath the injection field with a sensitivity of 1.3 feet. PgG seems confident that hydraulic mounding beneath the proposed injection field will be limited, and will not create radial groundwater flow in a direction other than to the north/northwest.

4) Revised Figure 2 (Well Field Site Plan) identifies three monitoring wells locations: one upgradient/background well; one beneath the injection field; and, one downgradient along the property boundary approximately 1,200 feet north/northwest of the injection field. It was understood during the meeting that once these three wells were installed and a site-specific groundwater flow direction and gradient were calculated, then a fourth well would be installed at a location based upon this new information. Is that correct? In addition, Figure 3 diagrams the proposed monitoring well construction with 20 feet of well screen positioned 90 feet below the water table (330-350 feet bgs). While the FS Report does not describe the rationale for such construction, you mentioned during the meeting that this is the interval from which downgradient supply wells are drawing. While this screened makes sense for downgradient monitoring wells along the property boundary, the well installed beneath or immediately downgradient from the injection field should be screened across the water table where the highest concentrations of pollutants would be expected. This well would also be ideally positioned to detect any disinfection byproducts entering the aquifer. The upgradient/background well would be useful for evaluating the native groundwater geochemistry such that downgradient monitoring samples affected by the plume could be more readily identifiable. Which monitoring parameters do you believe will be most useful in identifying the plume, or in distinguishing native groundwater unaffected by the injection verses samples collected from within the plume? This question has implications for possible dye tracer tests which were suggested as impractical at this site.

   Also, while there is no discussion of what procedures would be used to collect groundwater samples from the monitoring wells, it is assumed that low-flow purge/sampling protocols will be used. In this case, it may be useful to

install well screens greater than 20 feet in length so that discrete samples could be collected from varying depth intervals.

5) Figure 4 shows a potentiometric surface map of the SGA. At the Cowlitz Tribe Casino site, groundwater is show flowing to the north/northwest, but there are no data points for hydraulic head in the study area. It was suggested that once site-specific gradient information was established from three monitoring well installations, that a fourth (or potentially more) would be located based upon this information. In addition to the presumed north/northwest component of horizontal gradient, it was suggested that there was a downward component of gradient due to recharge as shown on the Figure 6 cross-section in which the plume is migrating downward. It is not clear if this presumption is based on any site specific data, but due to the proximity of the Lewis River which is the likely discharge point for the SGA, one would think that the vertical component of hydraulic gradient would be level or upward.

Rob Rau
U.S. Environmental Protection Agency, Region 10
Office of Compliance and Enforcement
Ground Water Unit
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101
(206) 553-6285
rau.rob@epa.gov
Region 10 Tanks
Region 10 Diving